

CLAIMS

What is claimed is:

1. A seal positionable within a knife gate valve and engageable with a surface of a movable knife gate oriented transversely to an axial direction defining flow through said valve, said seal for effecting a fluid-tight closure of said valve, said seal comprising:

a flexible, resilient loop positionable within said valve adjacent to said knife gate, said loop comprising:

a flexible, resilient sealing lobe extending around said loop, said sealing lobe having a deformable sealing surface facing in said axial direction and being engageable with said knife gate surface;

a first channel extending around said loop and positioned opposite to said sealing lobe, said first channel facing in said axial direction away from said sealing lobe; and

a second channel extending around said loop and positioned adjacent to said sealing lobe, said second channel facing inwardly of said loop.

2. A seal according to Claim 1, wherein said loop has a substantially circular shape.

3. A seal according to Claim 1, further comprising a reinforcing band engaging said loop.

4. A seal according to Claim 3, wherein said reinforcing band is positioned substantially within one

of said first and second channels, said reinforcing band extending substantially continuously around said loop.

5. A seal according to Claim 4, wherein said reinforcing band is positioned substantially within said first channel.

6. A seal according to Claim 4, wherein said reinforcing band is substantially encapsulated within said loop.

7. A seal according to Claim 4, wherein said reinforcing band has a toroidal shape.

8. A seal according to Claim 7, wherein said reinforcing band is comprised of a material having a modulus of elasticity higher than said loop.

9. A seal according to Claim 8, wherein said material comprising said reinforcing band is chosen from the group consisting of engineering plastics, elastomers, carbon steel and stainless steel.

10. A seal according to Claim 1, wherein said loop and said sealing lobe are comprised of a flexible, resilient material.

11. A seal according to Claim 10, wherein said material comprising said loop is selected from the group consisting of natural rubber, elastomeric compounds and thermoplastics.

12. A seal according to Claim 1, wherein said deformable sealing surface comprises:

a leading edge projecting in said axial direction;

a first annular surface extending inwardly of said loop from said leading edge; and

a second annular surface extending outwardly of said loop from said leading edge.

13. A seal according to Claim 12, wherein one of said annular surfaces is angularly oriented toward said first channel.

14. A seal according to Claim 12, wherein one of said annular surfaces is substantially flat.

15. A seal according to Claim 2, wherein said loop comprises an outwardly facing perimeteral surface having a flat region oriented substantially parallel to a chord line through said loop, said flat region being engageable with a complementary flat surface within said knife gate valve.

16. A seal positionable within a knife gate valve and engageable with a surface of a movable knife gate oriented transversely to an axial direction defining flow through said valve, said seal for effecting a fluid-tight closure of said valve, said seal comprising:

a loop formed of a flexible, resilient material, said loop being positionable within said valve adjacent to said knife gate, said loop comprising:

a sealing lobe formed of a flexible resilient material, said sealing lobe extending around said loop and having a deformable sealing surface facing in said axial direction and being engageable with said knife gate surface;

a first channel extending around said loop and positioned opposite to said sealing lobe, said first channel facing in said axial direction away from said sealing lobe;

a second channel extending around said loop and positioned adjacent to said sealing lobe, said second channel facing inwardly of said loop; and

a reinforcing band formed of a material stiffer than said materials comprising said loop, said reinforcing band being attached to said loop within said first channel and extending around said loop.

17. A seal according to Claim 16, wherein said reinforcing band extends substantially completely around said loop.

18. A seal according to Claim 16, wherein said loop has a substantially circular shape.

19. A seal according to Claim 16, wherein said reinforcing band is substantially encapsulated within said loop.

20. A seal according to Claim 16, wherein said loop is formed from a material selected from the group consisting of natural rubber, elastomeric compounds and thermoplastics.

21. A seal according to Claim 16, wherein said reinforcing band has a toroidal shape.

22. A seal according to Claim 16, wherein said deformable sealing surface comprises:

a leading edge projecting in said axial direction;

a first annular surface extending inwardly of said loop from said leading edge; and

a second annular surface extending outwardly of said loop from said leading edge.

23. A seal according to Claim 22, wherein one of said annular surfaces is angularly oriented toward said first channel.

24. A knife gate valve having a knife gate movable within a housing to effect opening and closing of said valve, said knife gate having oppositely facing surfaces oriented transversely to an axial direction defining flow through said valve, said knife gate valve comprising:

a flexible, resilient loop mounted within said housing adjacent to said knife gate, said loop comprising:

a sealing lobe extending around said loop, said sealing lobe having a deformable sealing surface facing in said axial direction and being engageable with one of said knife gate surfaces to effect a fluid tight seal when said one surface is moved into engagement with said sealing lobe to close said valve;

a first channel extending around said loop and positioned opposite to said sealing lobe, said

first channel facing in said axial direction away from said sealing lobe; and

a second channel extending around said loop and positioned adjacent to said sealing lobe, said second channel facing inwardly of said housing.

25. A knife gate valve according to Claim 24, wherein said loop has a substantially circular shape.

26. A knife gate valve according to Claim 24, further comprising a reinforcing band positioned substantially within one of said first and second channels, said reinforcing band extending around said loop.

27. A seal according to Claim 24, wherein said reinforcing band extends substantially completely around said loop.

28. A knife gate valve according to Claim 26, wherein said reinforcing band is positioned substantially within said first channel.

29. A knife gate valve according to Claim 28, wherein said reinforcing band is substantially encapsulated within said loop.

30. A knife gate valve according to Claim 26, wherein said reinforcing band has a toroidal shape.

31. A knife gate valve according to Claim 24, wherein said loop is formed from a material selected from the group consisting of natural rubber, elastomeric compounds and thermoplastics.

32. A knife gate valve according to Claim 24, wherein said deformable sealing surface comprises:

a leading edge projecting in said axial direction;

a first annular surface extending inwardly of said loop from said leading edge; and

a second annular surface extending outwardly of said loop from said leading edge.

33. A knife gate valve according to Claim 32, wherein one of said annular surfaces is angularly oriented toward said first channel.

34. A knife gate valve according to Claim 32, wherein one of said annular surfaces is substantially flat.

35. A knife gate valve according to Claim 24, further comprising:

another flexible, resilient loop mounted within said housing adjacent to said knife gate, said loop comprising:

another sealing lobe extending around said other loop, said other sealing lobe having another deformable sealing surface facing in said axial direction and being engageable with another of said knife gate surfaces to effect a fluid tight seal when said other surface is moved into engagement with said other sealing lobe to close said valve;

a third channel extending around said other loop and positioned opposite to said other sealing lobe, said third channel facing in said axial direction away from said other sealing lobe;

a fourth channel extending around said other loop and positioned adjacent to said other sealing lobe, said fourth channel facing inwardly of said housing; and

said knife gate being movable from a closed position between said seals wherein said sealing lobes engage said oppositely facing surfaces, to an open position wherein said knife gate is removed from between said seals, said sealing lobes being positioned within said housing in facing relationship and engaging one another under compression so as to effect a seal around said housing.

36. A knife gate valve according to Claim 35, wherein said other loop further comprising another reinforcing band positioned substantially within one of said third and fourth channels, said other reinforcing band extending around said other loop.

37. A knife gate valve according to Claim 36, wherein said other reinforcing band is positioned substantially within said third channel.

38. A knife gate valve according to Claim 37, wherein said other reinforcing band is substantially encapsulated within said other loop.

39. A knife gate valve according to Claim 36, wherein said other reinforcing band has a toroidal shape.

40. A knife gate valve according to Claim 35, wherein said other loop is formed from a material

selected from the group consisting of natural rubber, elastomeric compounds and thermoplastics.

41. A knife gate valve according to Claim 35, wherein said other deformable sealing surface comprises:

another leading edge projecting in said axial direction;

a third annular surface extending inwardly of said other loop from said other leading edge; and

a fourth annular surface extending outwardly of said other loop from said other leading edge.

42. A knife gate valve according to Claim 41, wherein one of said third and fourth annular surfaces is angularly oriented toward said third channel.